

Water Conservation Opportunities

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Presentation Overview

- Why Water Conservation
- Authority to Proceed
- Overall Water Rates
- Typical Analyses
- Project Review

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Why Water Conservation?

- **Extremely Cost Effective** (2-4 Yr Project Payback)
 - Focus is on Shower Heads (Energy + Water)
- **Results in Energy Savings** (for many applications)
- **Most Important:**

Water Conservation provides the Federal Sector and the Utility with additional potential to install Energy Efficient Equipment

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Additional Potential

- **10 Year Simple Payback Desired**
- **For a 4 Year Payback on Water Measures:**

Every \$1,000 of water conservation enables the installation of \$1,500 of energy efficient equipment without exceeding a 10 year payback.

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Federal Authority

- **Executive Order 13123**
 - Clearly Encourages Water Conservation
- **GSA Areawide Agreements**
 - Written to encourage cost effective installations
 - Allows broad interpretation of Utility services
 - Does not differentiate between Utility products
- **Decision to proceed**
 - Limited only by the Utility's service offering

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Utility Company Authority

- Water Conservation Saves Energy
 - Heating Energy (Gas & Electric)
 - Pumping Energy (City/Water District)

$$\text{BHP}_{\text{Pump Shaft}} = \frac{\text{GPM} \times \text{TDH}}{3,960 \times \eta_{\text{Pump}}}$$

... or about 9.0 kWh per hour of usage for a 3 GPM Faucet

- Water conservation must be supported by the Utilities to achieve these energy reductions

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Water & Sewer Rates

• Typical San Diego Rates

– Commercial:

- Water: \$3.75 per 1000 gallons (KG)
- Sewer: \$2.25 per 1000 gallons (KG)
- Total: \$6.00 per 1000 gallons (KG)

– Residential:

- Water: \$5.00 per 1000 gallons (KG)
- Sewer: \$3.00 per 1000 gallons (KG)
- Total: \$8.00 per 1000 gallons (KG)

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Domestic Hot Water (DHW)

- Assumptions: San Diego Area
- Commercial Customer
- Heating rise = $140^{\circ}\text{F} - 60^{\circ}\text{F} = 80^{\circ}\text{F}$

$$\frac{8.337 \frac{\text{lb}}{\text{Gal}} \times 1,000 \frac{\text{Gal}}{\text{kGal}} \times 80^{\circ}\text{F} \times 1 \frac{\text{BTU}}{\text{lb}^{\circ}\text{F}}}{80\% \text{ Eff}} = 833,700 \frac{\text{BTU}}{\text{kGal}}$$

- At a Gas Cost of \$0.60 per therm (100,000 btu):

$$833,700 \frac{\text{BTU}}{\text{kGal}} \times \frac{\$0.60}{100,000 \text{ BTU}} = \frac{\$5.00}{\text{kGal}}$$

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Residential ULF Tank Type Water Closet

- Old Standard Fixture = 5.0 Gal/Flush
Water Savings = $5.0 - 1.6 = 3.4$ GPF
- New ULF fixture = 1.6 GPF
Flushes per day = 12

$$12 \frac{\text{Flush}}{\text{Day}} \times 3.4 \frac{\text{Gal}}{\text{Flush}} \times 365 \frac{\text{Day}}{\text{Year}} = 14,892 \frac{\text{Gal}}{\text{Year}} \text{ Saved}$$

- Savings Calculation at \$8.00/1,000 Gal:

$$14,892 \frac{\text{Gal}}{\text{Year}} \times \frac{\$8.00}{1,000 \text{ Gal}} = \frac{\$119}{\text{Year}} \text{ Savings}$$

- Installed cost = \$700 ea
Overall cost = \$625 ea
- Rebate = \$75 ea
Simple Payback = \$625/\$119

5.25 years

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Commercial ULF Flush Valve Water Closet

- Old Standard Fixture = 4.0 Gal/Flush
Water Savings = $4.0 - 1.6 = 2.4$ GPF
- New ULF fixture = 1.6 GPF
Flushes per day = 24

$$24 \frac{\text{Flush}}{\text{Day}} \times 2.4 \frac{\text{Gal}}{\text{Flush}} \times 260 \frac{\text{Workdays}}{\text{Year}} = 14,976 \frac{\text{Gal}}{\text{Year}} \text{ Saved}$$

- Savings Calculation at \$6.00/1,000 Gal:

$$14,976 \frac{\text{Gal}}{\text{Year}} \times \frac{\$6.00}{1,000 \text{ Gal}} = \$90 \text{ Per Year Savings}$$

- Installed cost = \$700 ea
Overall cost = \$625 ea
- Rebate = \$75 ea
Simple Payback = \$625/\$89.86

6.95 years

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Commercial ULF Flush Valve Urinal

- Old Standard Fixture = 3.0 Gal/Flush
Water Savings = $3.0 - 1.0 = 2.0$ GPF
- New ULF fixture = 1.0 GPF
Flushes per day = 30

$$30 \frac{\text{Flush}}{\text{Day}} \times 2.0 \frac{\text{Gal}}{\text{Flush}} \times 260 \frac{\text{Workdays}}{\text{Year}} = 15,600 \frac{\text{Gal}}{\text{Year}} \text{ Saved}$$

- Savings Calculation at \$6.00/1,000 Gal:

$$15,600 \frac{\text{Gal}}{\text{Year}} \times \frac{\$6.00}{1,000 \text{ Gal}} = \$93.60 \text{ Per Year Saved}$$

- Installed cost = \$600 ea
Simple Payback = \$600/\$93.60

6.41 years

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Commercial ULF Shower Head

- Old Standard Fixture = 5.0 Gal/Minute
Water Savings = $5.0 - 2.5 = 2.5$ GPM
- New ULF fixture = 2.5 GPM
Minutes per Use = 5
- Uses Per Day = 3

$$3 \frac{\text{Uses}}{\text{Day}} \times 5 \frac{\text{Minutes}}{\text{Use}} \times 2.5 \frac{\text{Gallons}}{\text{Minute}} \times 260 \frac{\text{Days}}{\text{Year}} = 9,750 \frac{\text{Gal}}{\text{Year}} \text{ Saved}$$

- Savings Calculation at \$6.00/1,000 Gal and \$5.00/1,000 Gal Heating Assuming 50% Hot Water Use:

$$9,750 \frac{\text{Gal}}{\text{Year}} \times \left[\frac{\$6.00}{1,000 \text{ Gal}} + \frac{\$5.00}{1,000 \text{ Gal}} \times 50\% \right] = \$82.88 \text{ Per Year Saved}$$

- Installed cost = \$80 ea
Simple Payback = \$80/\$82.88

0.97 years

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Commercial Faucet Aerators

Old Standard Fixture = 4.0 Gal/Minute New ULF fixture = 2.75 GPM
Savings = 4.0 - 2.75 = 1.25 GPM Minutes per Day Usage = 5

$$5 \frac{\text{Minutes}}{\text{Day}} \times 1.25 \frac{\text{Gallons}}{\text{Minute}} \times 260 \frac{\text{Days}}{\text{Year}} = 1,950 \frac{\text{Gal}}{\text{Year}} \text{ Saved}$$

Savings Calculation at \$6.00/1,000 Gal and \$5.00/1,000 Gal Heating
Assuming 25% Hot Water Use:

$$1,950 \frac{\text{Gal}}{\text{Year}} \times \left[\frac{\$6.00}{1,000 \text{ Gal}} + \frac{\$5.00}{1,000 \text{ Gal}} \times 25\% \right] = \$14.14 \text{ Per Year Saved}$$

- Installed cost = \$75 ea Simple Payback = \$75/\$14.14
5.30 years

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Other Conservation Measures

Irrigation Design: Grass areas are best watered with sprinklers. Trees, shrubs, flower beds, and groundcovers are most efficiently watered with low volume sprinklers, drips, or bubblers.

Irrigation Controllers: Choose a controller which offers flexibility to set the time, day, and repeat cycles for each valve with devices that also automatically turn the system off by sensing soil moisture or detect rainfall. Operate sprinklers during late night or early morning hours in low wind conditions.

Xeriscape

Horizontal Clothes Washers

"Pistol grip" normally closed hose shutoff

Reclaimed "gray water" for irrigation

Pool covers

"Water Saver" Dishwashers

Once through water cooling

DHW recirc piping & insulation

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San Diego Area Projects

- All Utility Contracts at SDG&E since 1997 have included a Water Conservation Component.
- Approximately 10% of each Project is Water
 - Allows 15% additional Mechanical work to be completed
- Project Review
 - Fleet Combat Training Center, Pacific

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Fleet Combat Training Center

- Audit covered 19 Buildings
 - Mechanical Measures plus Water Measures
- Fixtures Evaluated

Low Flow Showerheads (Qty 26)	ULF Water Closets (Qty 138)
Faucet Aerators (Qty 155)	ULF Urinals (Qty 80)
- Simple Payback
 - Average \$4.40/1,000 Gal (Water & Sewer)
 - 3.6M Gallons/Year Reduced
 - \$16,000 per Year Saved
 - \$68,000 Installed Cost

4.3 Year Simple Payback

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Fleet Combat Training Center

- Mechanical Project - \$3M Total
 - Chiller Installation
 - Air Handler & Mechanical Renovation
 - Water Measures
- Additional Work Supported
 - 4.3 Year Payback to a 10 Year Payback
 - \$68,000 Installed Cost
 - Direct Ratio -

\$90,000 of additional Mechanical Work
3% to 5% Increase in Potential

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Summary

- Water Conservation Is Allowed
 - Authority to Incorporate is Present
- Rates are the Key to Cost Effectiveness
 - Evaluate rates in your specific area
- Calculations are Straight Forward
 - Focus on Shower Heads for Cost Effectiveness

Water Conservation Makes Sense

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